CRES REPORT

The Center for Reproduction of Endangered Species (CRES) is operated by the Zoological Society of San Diego

SUMMER·1992

100 Cheetahs and Counting...

On June 4, Jasiri, a cheetah at the CRES research facility, gave birth to a litter of 5 cubs—the largest surviving litter born at the Wild Animal Park in more than 15 years—bringing the total born to an even 100. This is Jasiri's third litter but is the first for her mate, Bonti, who was acquired from Pretoria in May 1991. He is a carrier of the recessive king gene, which will result in offspring with a blacker, more irregular coat pattern when the gene is acquired from both parents.

The cheetah breeding program started in 1970, with the importation of 10 animals from Namibia. We housed the cheetahs in an off-exhibit breeding facility at the Wild Animal Park. Society Pathologist Dr. Lynn Griner and Research Associate Robert Herdman spent the next 6 years studying cheetah behavior, and the animals subsequently produced 34 cubs. The Park's animal services department maintained the collection for the next 4 years and, unfortunately, as the population aged, reproduction ceased.

Then, in 1981, Dr. James Dolan, director of collections for the Society, asked Dr. Donald Lindburg, the CRES staff behaviorist, to begin work with the cheetahs in an effort to propagate this species once again. Efforts were made to infuse the collection with younger, more viable animals. Our attention was directed to the social behavior

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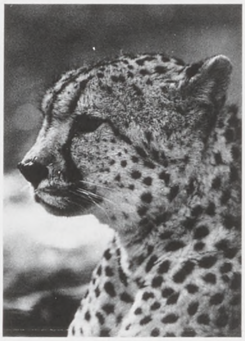
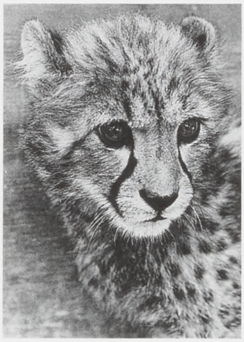
100 Cheetahs and Counting . . . (continued from page 1)



of the cheetah, housing considerations, and methods to detect estrus in the females. Little was known about these topics, because few cheetahs had reproduced in captivity at the time. An on-site research staff member joined the project to collect information on a daily basis.

We are fascinated by all we have learned about the biology of the cheetah in the last 11 years. The cheetah appears to be highly selective in its mate preference; thus, as the size of the collection grew, so did the number of compatible pairs. Many hours were spent pairing potential mates until the right matches were found.

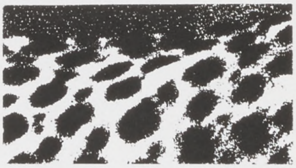
We relied on the females to exhibit behavioral signs of estrus as an indication of appropriate times to pair them with males. As the population of adult females increased, it became evident that many females had a "silent" estrus and behavioral indicators were not obvious. We have since developed a management style that allows all adult females an exposure to breeding males. Many of our resultant litters can be attributed to this practice.



The success rate has been good, and a high percentage of our cubs – 82 percent – have been live born. Also, 7 different females and 11 different males (out of 12 tried) have accounted for the 18 litters born since the start of CRES management in 1981. One theory suggests that because the quality of cheetah semen is so poor, containing a high percentage of abnormal sperm, there must be a significant prevalence of male infertility. We have tested this theory with our animals. With 92 percent of the males reproducing, we have concluded that poor reproduction among cheetahs is best explained by husbandry styles of management.

The 100th cheetah birth is truly a milestone that leaves us enthusiastic about the future and the promise of learning yet undiscovered facts about the cheetah. ■

Inside CRES



● Pathology

In addition to their important role as disease diagnosticians, the San Diego Zoo's three veterinary pathologists are actively involved in investigations of new and emerging disease syndromes. One such investigation involves the characterization of recurring bone and cartilage tumors in koalas. Preliminary results of this collective effort between pathologists, clinical veterinarians, and CRES Virologist/Immunologist Dr. Michael Worley suggest a virus infection may be the underlying cause. Another area of research involves a recently discovered and unusual type of cancer of the white blood cells affecting the lower intestinal tract of Galápagos tortoises. Further studies, in collaboration with Dr. Worley, are designed to clarify the origin of these tumors. ■

● Genetics

Petr Spala, a visiting scholar at CRES in 1991-1992, has returned home to Czechoslovakia after studying techniques in molecular genetics and population management. His work was part of a project in Transfer of Technologies for the Management of Genetic Resources for Conservation funded by the **Pew Charitable Trusts** and the **John and Beverly Stauffer Foundation**. During his time at CRES, Mr. Spala studied the genetics of northern white rhinos. This is the most endangered form of rhino, with only 32 remaining in the wild and 10 in captivity. The only successful captive-breeding group of this rhino species is at the Vychodoćeska Zoo in Dvůr Králové, Bohemia, Petr Spala's hometown. Another major project that Mr. Spala worked on was an investigation of the genetic differentiation of geographic forms of the plains zebra, based on comparison of mitochondrial DNA. These studies, which are the first of their kind, provide support for the recognition of several subspecies of zebra that were previously based solely on subtle differences in striping pattern. Included in his study were the rare maneless zebras found in northeastern Uganda and northwestern Kenya. ■

● Reproductive Physiology

Postdoctoral Fellow Dr. Nancy Pratt has joined Dr. Barbara Durrant in the reproductive physiology division, where she will conduct studies to assess the potential fertility of cryopreserved sperm. The long-term preservation of many endangered species will depend on the genetic material stored in our Frozen Zoo; therefore, it is important to learn how to freeze semen without injuring the sperm cells. A first step requires detailed examination of the membranes surrounding the nuclear material of each sperm cell, which reveals that cell's ability to bind to the ovum as a prelude to fertilization. If these membranes—known collectively as the acrosome—are damaged because of freezing, the sperm will not be capable of fertilization. Visual analysis alone (even with a light microscope) is not enough to determine if the membrane is intact. Dr. Pratt is developing a sperm stain that binds to the acrosome, turning it bright blue. Sperm stained in this way are easily identified as acrosome-intact (potentially fertile) or acrosome-damaged (infertile). Preliminary studies conducted on sperm from cheetahs, peccaries, Przewalski's horses, and forest buffalo indicate that this stain will have broad application for fertility prediction in mammals. ■

● Virology

The human hepadnavirus, hepatitis B virus (HBV), is second in importance only to tobacco as a known human carcinogen, and it infects hundreds of millions of people throughout the world. It is well documented that HBV infects chimpanzees; however, the infection of gorillas with HBV or HBV-like virus is rare. Using polymerase chain reaction technology to detect small amounts of viral DNA in blood, CRES Virologist Dr. Michael Worley has recently found hepadnavirus infection in three captive western lowland gorillas. The DNA sequence of one of these viruses has been determined, and initial computer analysis of the sequence suggests that the gorilla virus is closely related to, but distinct from, HBV. This finding raises questions about the origin of these viruses and whether HBV vaccines prepared for humans can also protect gorillas from infection. The next step, determining the complete DNA sequence of additional gorilla viruses, will provide the foundation that may lead to answers to these questions. ■

● Endocrinology

The highly endangered giant South American river turtle is found in the tributaries of the Amazon and Orinoco rivers. In Colombia, efforts are under way to protect the species and help the Indians manage populations of these turtles as a renewable resource. Part of this conservation effort involves collecting eggs from natural nests, to protect them from flooding and poachers, and they are then incubated in artificial nests. One of the problems with artificial incubation of eggs is the uncontrolled effect of temperature, which often results in hatchlings of all one sex. (Incubation temperature determines the sex of most turtles and all crocodiles.) CRES Endocrinologist Dr. Valentine Lance has developed a method to identify the sex of immature turtles (male and female hatchlings appear identical) that involves measurement of hormones in the blood. In Colombia, Dr. Lance used this method to identify the sex of 180 giant river turtles that had been hatched from eggs incubated at different temperatures, as well as from some that had hatched from natural nests in the Amazon region of Colombia. The method is now being tested on the Zoological Society's collection of young Galápagos and spur tortoises hatched here, and also on the desert tortoises hatched at the Desert Tortoise Conservation Center in Nevada. ■

● Behavior

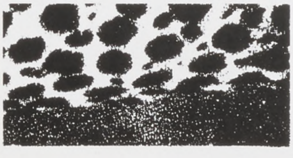
What parts of Gorilla Tropics will the gorillas use? Will children learn something from the gorilla statues or will they just use them as a "jungle gym"? Will the rain forest sound system enhance the visitor experience or is it just an annoyance? These are just some of the questions that the behavior division at CRES has been trying to answer. For the past year, Dr. Jackie Ogden, with the help of volunteer observers, has been conducting an evaluation of the new Gorilla Tropics exhibit. This represents a fairly new direction for the behavior division: an attempt to conduct applied research in the zoo setting in order to get feedback on how these new exhibits work for both the animal residents and zoo visitors. The findings, in

(continued)

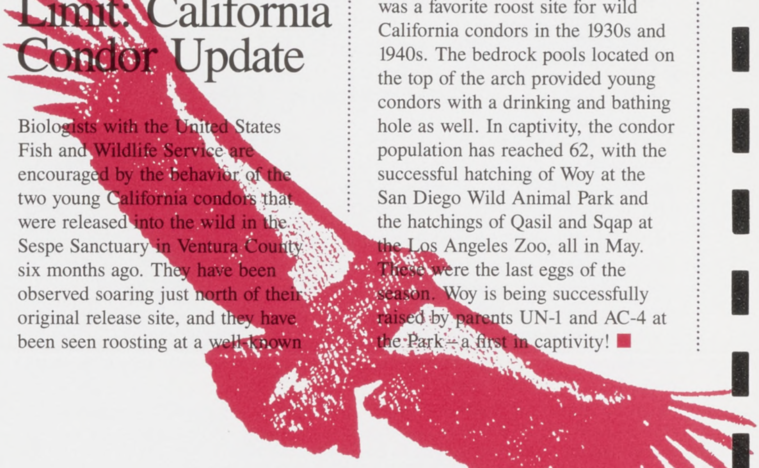
part, reveal that: the gorillas "hang out" in flat areas near the night quarters, particularly in areas with objects in them like trees or walls (results similar to those found with five other gorilla groups); children do learn about the size and social groupings of gorillas from being around the statues (although some also "learn" that gorillas eat woodchips); and the rain forest sounds do enhance the visitor experience and favorably affect visitors' emotional responses to the exhibit and the animals. ■

• Comparative Physiology

Over a nine-year period at the San Diego Zoo, a large captive colony of green iguanas was the focus of a study of the components of sexual maturation. Under investigation were morphological (including body weight and testes size), social, and physiological (specifically, hormone levels) aspects. Part of the study will evaluate the space requirements that lead to normal reproduction in captivity for iguanas. Drs. John Phillips, Nancy Pratt, and Alison Alberts found that males may mature early (16 to 18 months) because of the advantage of mating whenever possible with older females. Also, larger, more aggressive, and faster-growing males are likely to rank higher than smaller males in the dominance hierarchy that is established early in development. By contrast, females did not mature until 1 to 2 years later, and then at a substantially larger body size (almost 200 percent of mean male size at puberty). Female maturation may be delayed and linked to laying large clutches of eggs. All of these factors may affect ultimate reproductive success. ■



The Sky's the Limit: California Condor Update



Biologists with the United States Fish and Wildlife Service are encouraged by the behavior of the two young California condors that were released into the wild in the Sespe Sanctuary in Ventura County six months ago. They have been observed soaring just north of their original release site, and they have been seen roosting at a well-known condor spot. Hole in the Wall, a large rock arch near the release site, was a favorite roost site for wild California condors in the 1930s and 1940s. The bedrock pools located on the top of the arch provided young condors with a drinking and bathing hole as well. In captivity, the condor population has reached 62, with the successful hatching of Woy at the San Diego Wild Animal Park and the hatchings of Qasil and Sqap at the Los Angeles Zoo, all in May. These were the last eggs of the season. Woy is being successfully raised by parents UN-1 and AC-4 at the Park—a first in captivity! ■

A Gift For CRES

Gotschalk's Graphics CRES T-shirt.

Gotschalk's Graphics, a San Diego-based company, has created two fabulous T-shirts for the benefit of CRES. Designer Jill Gotschalk used a stylized yet realistic approach while developing these beautiful shirts. Jill is considered one of the top designers in her field and has received national and international awards for her work. A portion of the proceeds from each shirt sold is donated to CRES.

One full-color shirt features the CRES name with beautiful drawings on both front and back of endangered animals such as the Asian elephant, clouded leopard, and Przewalski's horse. The other shirt has an Asian tropical rain forest theme, with a Sumatran tiger on the front and a collage of rain forest animals on the back.

Both T-shirts are available at the San Diego Zoo and San Diego Wild Animal Park gift shops. In addition, shirts may be purchased by mail order through the Zoological Society's merchandising department by calling (619) 451-1792 or, toll free, 1-800-628-3179. ■

Gotschalk's Graphics CRES Asian tropical rain forest T-shirt.

THE WILDEST PARTY IN TOWN!

The Zoological Society of San Diego
Invites You To
Take a Walk on the Wild Side
At The Twelfth Annual
CELEBRATION FOR THE CRITTERS

Date: Friday, October 2, 1992 (Get on the Right Track – Reserve your place now!)

Time: 6:30 to 11 P.M. (Nighttime is the Right Time for a Walk on the Wild Side!)

Place: Make Tracks to the Atlas Ballroom, Town & Country Convention Center, Mission Valley

Dress: Cocktail Attire (Fantastic Footwear optional)

Entertainment: Step out on the dance floor for some Fancy Footwork. Live music by The Heroes will get your toes tappin', your feet stompin', and your body swayin'.

Silent Auction: From 6:30 to 10 P.M. There are more wonderful getaways, dinners, and other wild gifts than ever before – the "pawsabilities" are nearly endless!

Refreshments: Cool your heels for a bit and fill up with an incredible array of "sole" food at our bountiful buffets. Step up to the bar for dollar drinks.

Price: Tickets are $40 in advance and $50 at the door. If payment of $40 per person is received on or before September 1 (postmark cutoff, August 27), you will be eligible to attend a special pre-party at the San Diego Zoo on September 2. That's two parties for the price of one! At this price, you could even foot the bill for a friend!

Tickets will be mailed for reservations received by September 22. And to thank you for being a step ahead and purchasing your ticket by September 22, we'll give you two free drink coupons to use at the Celebration and a special value coupon for a free, colorful wildlife notepad cube with any purchase of $10 or more at our Exotic Emporium the night of the event.

For more information, call (619) 557-3974 between 9 A.M. and 4 P.M. weekdays.

Got itchy feet?... We'll be giving away a trip for two to Tokyo aboard American Airlines at this year's **Celebration for the Critters!**

Help us continue to put our best foot forward at CRES. Proceeds from the Celebration for the Critters benefit CRES, and your support can make an important difference to our continuing efforts to create new hope for endangered wildlife – and that's quite a feat!

C'mon – Take a Walk on the Wild Side!

☐ Yes, I want to **Take a Walk on the Wild Side!** Count me in on October 2. Enclosed is $____________ to cover ____________ advanced reservations at $40 per person.* (Tickets will be $50 at the door.) C2CR

☐ Please charge my ☐ MasterCard® ☐ VISA®

Card Number________________________

Expiration Date________________________

Signature________________________
(Name as it appears on card)

☐ Sorry, I/we can't join the party animals at the Celebration but enclosed is my/our gift of $____________ for the critters. C2D

Please make checks payable to CRES.

Tickets will be mailed for reservations received by September 22.

*Sorry, no refunds. You must be at least 21 years of age to attend.

Please Print:

Dr./Mr./Mrs./Ms.________________________

Address________________________

City/State/Zip________________________

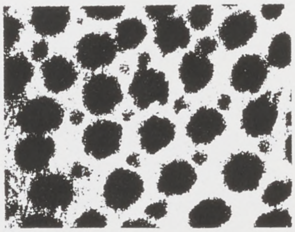
Phone (Day)__________________ (Evening)__________________

Please make checks payable to CRES and mail to:
Celebration for the Critters/San Diego Zoo • P.O. Box 551/San Diego, California 92112

Recent Grants

Special thanks to **Bio-Rad Laboratories, Inc.** for donating equipment to the CRES endocrinology division. The equipment will be used to monitor ovulation in giant pandas, which are in danger of extinction. A generous grant from the **L.S.B. Leakey Foundation** is providing funds to send a student researcher to the Karisoke Research Center in Rwanda for six months to monitor reproduction in mountain gorillas. Information obtained from this study will permit analysis of the causes of infertility in captive gorilla populations. A summer intern has been named to work with the CRES behavior division, thanks to a grant from the **Heimple Charitable Foundation.** Manetta Cornette, a second-year veterinary student from Auburn University, will be studying the role of olfaction in regulating cheetah social interactions.

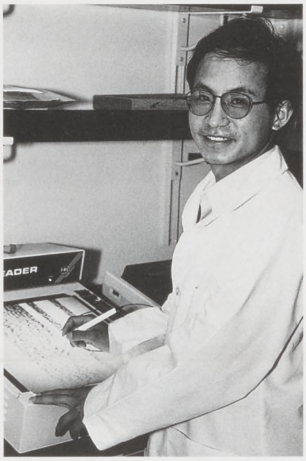
Stratagene, Inc., a San Diego-based company specializing in products for use in biotechnology research, has recently recognized CRES scientific efforts with a generous donation of products. "Stratagene's gift comes at an especially helpful time," said Dr. Oliver Ryder, CRES geneticist and Kleberg Genetics Chair. "As we are conducting more and more molecular studies at CRES, our needs for high-quality reagents for our DNA amplification and sequencing studies have increased significantly. We greatly appreciate Stratagene's confidence in CRES, and we welcome them as partners in our efforts to conserve endangered species." ■



Chinese Geneticist Joins CRES

A distinguished scientist from China, Dr. Yaping Zhang from the Kunming Institute of Zoology, Academia Sinica, Yunnan Province, arrived in San Diego in May to begin collaborative efforts in the CRES genetics laboratory, under the supervision of Dr. Oliver Ryder. His studies have included phylogenetic relationships and molecular evolution in various primate species as well as other mammalian species. Dr. Zhang is a member of the Biochemical Society of China and the Genetica Society of China.

The Kunming Institute of Zoology is a leader in modern mammalogical research in China. The director, Dr. Shi Liming, approached the Zoological Society of San Diego several years ago with a request that one of his students engage in joint research at the CRES genetics laboratory. The visiting scientist would apply the most recently developed techniques of DNA analysis, those which are not yet in application in China.



During his one-year stay in San Diego, Dr. Zhang's topics of study will include molecular evolution of golden monkeys and evolution of giant pandas, lesser pandas, and bears. Samples from the Kunming Institute, the Society's Frozen Zoo, museum specimens, and from zoos throughout the world will form the basis of the investigations. This cooperative effort between the two organizations offers significant opportunities to contribute new information of direct relevance to wildlife conservation efforts both in China and in zoos. ■

Editor:
Mary Sekulovich

■

Editorial Assistant:
Betsy Sanders

■

Special thanks to
CRES REPORT
contributors:
Judy Kinsell
Donald Lindburg, Ph.D.
Susan Millard
Amy Parrott

■

Photographs by:
Ron Garrison
Ken Kelley

SAN DIEGO ZOO · SAN DIEGO WILD ANIMAL PARK

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